

UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

MONTANA TECHNICAL GUIDE

SECTION IV

## Trough or Tank (No.)

Trough or Tank MT-614

### Definition

A trough or tank, with needed devices for water control and waste water disposal, installed to provide drinking water to livestock.

### Scope

This standard applies to all troughs or tanks installed to provide livestock watering facilities supplied from spring, reservoir, well, or other sources.

### Purpose

To provide watering facilities for livestock at selected locations that will protect vegetative cover through proper distribution of grazing or through better grassland management for erosion control. Another purpose on some sites is to reduce or eliminate the need for livestock to be in streams, which reduces livestock waste there.

### Conditions Where Practice Applies

This practice applies where there is a need for new or improved watering places to permit the desired level of grassland management, to reduce health hazards for livestock, and to reduce livestock waste in streams.

### Design Criteria

**General.** This practice shall facilitate proper range use by improving distribution of grazing over all parts of the range, meeting the water requirements of livestock with adequately distributed water supplies.

**Capacity.** The trough or tank shall have adequate capacity to meet the water requirements the livestock. This will include the storage volume necessary to carry over between periods of replenishment.

The installation shall have a capacity to provide at least the gallons per head per day listed in Table 1.

Within a pasture, water storage capacity or other water sources should be provided to meet water requirements for a minimum of three days where water supply, pipeline, power or pump failure could cause loss of pipeline supplied water.

**Materials, General.** The quality and durability of all materials shall be in keeping with the planned useful life of the installation. Common Construction materials are reinforced concrete, steel and wood.

**Excess water disposal.** The site shall be well drained, or if not, drainage measures will be provided. Areas adjacent to the trough or tank that will be trampled by livestock shall be graveled, paved, or otherwise treated to provide firm footing and reduce erosion.

Automatic water level control and/or overflow facilities shall be provided as appropriate. Valves or pipes shall be protected by shields or covers to prevent damage by livestock.

Overflow shall be piped to a desirable point of release. Overflow facilities shall be installed on all tanks or troughs where inflow is not controlled by automatic flow control switches or valves or where malfunction of automatic flow controls may cause boggy conditions or erosion.

Provisions shall be made to prevent erosion or hazardous conditions at the overflow outlet. The overflow pipe shall be a minimum of 1/2 inch larger than the inflow pipe, or 2 inches, whichever is larger. A clean out shall be provided.

Note: This type of font (AaBbCcDdEeFfGg123..) indicates SCS National Standards

Table 1 MINIMUM DAILY STOCKWATER REQUIREMENTS, MONTANA

Livestock	Drinking Water Quant.		Maximum Water Spacing (miles)	
	Conventional Grazing System Gal/day	Intensive Grazing System Gal/day	Rough Relief	Gentle Relief
Range Cow	15	20	1/2	1
Cow & Small Calf	20	25	1/2	1
Horses & Mules	15	20	1/2	1
Sheep & Goats	2	4	1/2	1
Dairy Cow	25	30		
Hog	2			
Mule Deer	2		1	2
Antelope	2		2	3
Elk	8		1	3

Daily water consumption for livestock classes not listed may be calculated at one gallon per day per 100 lbs. of body weight.

Overflow outlets shall be protected from damage with rock, steel pipe, concrete or other durable material. The overflow shall extend a minimum of 20 feet beyond the tank.

**Drinking troughs or tanks.** All components of the trough or tank system shall have appropriate protective structures installed that will protect them from damage by livestock, vandals, farm operations, or other site specific hazards.

Tank or trough floors shall be placed on rock, fine gravel, or sand. Where these materials are not present, a minimum 4-inch layer of fine gravel or sand shall be placed between the floor and sub-base material.

When the area adjacent to the tank or trough must be treated, a minimum of 6 inches of course gravel, scoria, concrete, soil cement paving or other durable material shall extend to a minimum of 6 feet beyond the trough or tank.

**Tank Protection.** The trough and outlet pipes will be protected from freezing and ice damage if this is a potential problem. Freeze-proof troughs or electric heaters may be used at some sites.

Roofs can be placed over the trough to provide shade and reduce loss of water by evaporation.

**Frost proof and central storage tanks.** Frost proof and central storage tanks shall be designed to

withstand all anticipated internal and external loadings.

**Lightweight tanks.** Lightweight troughs or tanks made of fiberglass, plastic, wood or steel shall be secured with posts, cross bracing or other methods to provide a permanent installation.

**Concrete tanks or troughs.** Minimum thickness and steel for walls and floors shall be as specified on standard drawings or as tabulated below:

**Floors:** (maximum width or length 15 feet)

6 inches thick--#4 bars at 12-inch centers

**Walls:** (maximum height 36 inches)

4 inches thick--#3 bars at 9-inch centers

5 inches thick--#4 bars at 12-inch centers

6 inches thick--#4 bars at 9-inch centers

Reinforcing bars shall be bent and spliced so they are continuous in the floor and walls. Splices shall be a minimum of 30 bar diameters.

Wall and floor thickness and steel configuration for concrete tank or trough components not meeting these minimums will require appropriate structural analysis.

Acceptance of pre-cast components not meeting the above criteria shall be based on an engineering analysis provided by the supplier. If placement requirements are an integral part of the design, placement specifications shall be required.

Interior walls of troughs or tanks subject to freezing shall have a minimum taper of 1 inch horizontal to 12-inches vertical.

Where steel rim and concrete floor join, the metal shall be protected by a heavy coating of a non-conductor of electricity such as asphalt or similar coating.

Steel tanks. All steel tank material shall be galvanized, stainless steel, or factory coated with plastic or epoxy in a manner suitable for use in high exposure conditions.

Top edges of tanks shall be reinforced with rolled pipe, galvanized tube angle iron or other suitable reinforcement.

Tanks with steel bottoms shall be minimum 24 gauge for less than 6 feet diameter, and 20 gauge for larger diameters. The bottom side shall be joined in such a manner as to provide a locked and water tight seam. The underside bottom shall be thoroughly coated with asphaltic compound or other suitable permanent waterproof coating prior to final placement.

Steel walls for concrete, bentonite or membrane bottom tanks shall be constructed of galvanized steel not less than 16 gauge. Top edge reinforcement is not required for corrugated steel, 12 gauge or heavier.

Fiberglass. Fiberglass tanks or troughs shall have a nominal minimum thickness of 3/16 inch.

Fiberglass for use in tanks with concrete bottoms shall have a minimum nominal thickness of 1/4-inch.

Tank top edge shall be flanged reinforced by: 2-inch straight flange, minimum of 3/8-inch thick or 2-inch curled or rolled flange, minimum of 1/4-inch thick.

Plastic. Prior to use, each make, model and size of tank or trough manufactured from polyethylene plastic or other plastic compounds must be approved by the State Conservation Engineer. Approval will be based on operational field experience with specific materials and supplier provided information concerning configurations, laboratory tests, and other evidence supporting reasonable service life under field conditions.

Flexible Membrane or Bentonite Clay Base, Steel or Fiberglass Wall or Rim. Impervious membranes used in tank bottoms shall be designed to last the useful life of the tank. They may consist of commercially processed bentonite clay or flexible sheeting material such as polyvinyl chloride (PVC), butyl rubber, high density polyethylene (HDPE), asphaltic-sealed fabric liner or other sheeting material suitable for use as a buried impervious membrane.

Minimum thickness or application rate shall be:

Bentonite: 4 lbs/sq. foot  
Plastics: 10 mils  
Butyl Rubber: 15 mils  
Asphaltic Sealed Fabric: 1.5 mm

A minimum protective covering of six inches of sand or silty sand material shall be placed over the bentonite.

The size of the flexible membrane shall be such that it will lie loosely on the subgrade (approximately 10% slack) at all points around the tank, and extend up above the bottom of the rim a minimum of 9 inches.

The membrane shall be sealed to the inside of the rim using a sealer as recommended by the liner material manufacturer. The seal shall be at least six inches wide and continuous

around the complete perimeter of the tank.

A minimum protective covering of nine inches of sand or silty sand material shall be placed over the membrane.

### **Considerations**

The effects of the following shall be considered during planning:

**Water quantity considerations.** Effects of components of the water budget.

Effects on downstream flows or aquifers that affect other water uses or users.

**Water quality considerations.** Effects on erosion and movement of sediment, pathogens, and soluble and sediment-attached substances carried by runoff.

Effects on the visual quality of onsite and downstream water resources.

Effects on wetlands and water related wildlife habitats.

### **Plans and Specifications**

Plans and specifications for installing troughs and tanks shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

### **Operation and Maintenance**

An operation and maintenance plan shall be prepared for use by the owner or others responsible for operating and maintaining the system. The plan shall provide specific instructions for operating and maintaining troughs and tanks to insure that they function properly. It shall also provide for periodic inspections and prompt repair or replacement of damaged components or erosion.

The plan shall address the following:

Check periodically to see if any type of debris has fallen into the trough which may restrict the inflow or outflow system. Check tank for leaks or cracks and repair immediately if any cracks or wall separation are found. Check the automatic water level device to insure that it is operating properly. Make certain that the area adjacent to the trough is well protected with gravel, paving, or good cover. Be sure that the outlet pipe has a free outlet and is not causing any serious erosion problems.

If the trough has not been designed to prevent damage from freezing, it should be prepared for winter weather. This may include a measure such as adding material in the storage area to take up expansion.

Alga and iron sludges sometimes are problems in watering facilities. Chemicals such as copper sulfate and chlorine have been used. Local rules and regulations are to be followed when recommending chemicals.